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Low Profile Mining Machine

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ENGLISH-ABST:

A continuous mining machine employs a chain conveyor consisting of two separate chains with one-sided flights. The axes of the chain sprockets are located within the vertical plane so that the chains run within the plane generally parallel to the mine floor. The chains have universal links so they can change direction within the vertical plane as well. This arrangement allows substantially better special configuration than the present chain conveyors and the flights of the chains provide loading function, thus eliminating the need for the loader.

NO-OF-CLAIMS: 17

NO-DRWNG-PP: 3

SUMMARY:

FIELD OF THE INVENTION

[0001] The present invention relates generally to mining and specifically to underground mining machines capable of mining in tabular deposits of industrial minerals.

BACKGROUND OF THE INVENTION

[0002] Currently available mining machines are at least 26 inches high and designed to mine coal seams and other mineral deposits that are at least 30 inches high. Consequently, most of the coal seams that are narrower than 30 inches have not been extracted to date. The proposed invention allows construction of a mining machine that is less than 20 inches high and could be utilized in mining coal and other mineral seams that are less than 24 inches thick.

[0003] Continuous mining machines have been in popular use since the late 1940's. All continuous mining machines remove coal from the solid by engaging the solid coal in the seam with a power driven cutting mechanism. Full face cutting mechanisms which engage the full height of the seam are known as boring type machines and their cycle of operation is to bore into the face a predetermined distance, then back out and take another cut alongside the first one. Other full face cutting mechanisms do not contact the full height of the seam at any one time but must be moved vertically while in contact with the seam in order to remove the entire height of the seam (Wilcox U.S. Pat. No. 3,044,753, Jul. 7, 1962). Fairchild U.S. Pat. No. 4,226,476 dated Oct. 7, 1980 discloses a full face machine of the vertically movable type in which provision is made for installation of roof bolts. In general it can be stated that the full face machines are efficient only in seams which are relatively high. To date, continuous mining machines which have been used in low seams, such as 30[Doubleprime] and below, are not of the full face type but rather, of the type in which the cutters are moved laterally across the face. Perhaps the most successful low seam continuous miner of this type is the dual auger type embodying two oppositely pitched and oppositely rotated augers, each of which is movable vertically in addition to the lateral movement, such as for example in Wilcox U.S. Pat. No. 3,026,094 dated Mar. 20, 1962; and U.S. Pat. No. 3,269,776 dated Aug. 30, 1966.

[0004] Most of the existing mining machines, commonly referred to as continuous miners, consist of a frame, a cutter head for excavating the mineral, a loader for loading the excavated material onto a conveyor, a conveyor for transferring the material to the rear of the mining machine and a set of crawler tracks for propelling the machine forward or backwards. The cutter head, the loader and the conveyor drive are located in the front of the machine which requires a substantial space within that area. The rugged environment of the mine requires the conveyor to be resistant to damage and for that reason, a chain conveyor is usually used, which requires substantial additional space. The chain conveyor may utilize either a single-chain conveyor, with the chain running in the middle of the conveyor flights, or a double-chain conveyor, where the conveying flights are disposed between two chains. The upper strand of the chain conveyor is used to transport the material to the rear of the machine and additional space is required for the return strand of the chain. In order to reduce the height of the machine, it would be desirable to reduce the space required for the conveyor. It would be also desirable to eliminate the need for the loader.

[0005] Various attempts have been made to reduce the height of the mining machine. For example, Sartain, at al. U.S. Pat. Nos. 5,522647, 1996, and 5,720,527, 1998, disclose a continuous highwall mining machine with an armless conveyor system consisting of twin chains. Delli-Gatti, Jr. U.S. Pat. No. 5,871,260, 1999, discloses a continuous mining machine utilizing a gathering head with two counter-rotating discs in combination with a rear driven chain conveyor and a low angle deck to achieve low profile. Although the patent claims that this machine can operate in seams of 24 inches of less, it is doubtful that such and arrangement can achieve efficient removal of the excavated mineral.

[0006] Accordingly, it is the object of the present invention to provide a combination of loading transporting means

that can remove the mined mineral efficiently in a very low seam, preferably of 24 inches or less while also being capable of operating efficiently within thicker seams.

[0007] Another object of the present invention is the provision of an improved gathering and conveyor assembly for different types of cutting heads including the traditional ranging drum head.

[0008] Another object of the present invention is the provision of a continuous miner which is simple and economical to manufacture and maintain.

[0009] These and other objects of the present invention will become more apparent during the course of the following detailed description and appended claims.

[0010] The invention may best be understood with reference to the accompanying drawings, wherein an illustrative embodiment is shown.

SUMMARY OF THE INVENTION

[0011] In the proposed invention, the conveyor consists of two separate chains with one-sided flights. The axes of the chain sprockets are located within the vertical plane so that the chains run within the plane generally parallel to the mine floor. The chains have universal links so they can change direction within the vertical plane as well. This arrangement allows substantially better special configuration than the present chain conveyors. More importantly, the flights of the chains provide loading function, as they turn around the chain sprocket located on the loading apron of the machine, thus eliminating the need for the loader. The chains can be driven either at the front end or the rear end of the mining machine.

DRWDESC:

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a plan view of the preferred embodiment of the proposed mining machine;

[0013] FIG. 2 is the side view of the preferred embodiment of the proposed mining machine.

[0014] FIG. 3 is the side view of the preferred embodiment of the proposed mining machine with the discharge end of the conveyor and the cutter head in the raised position.

DETDESC:

DETAILED DESCRIPTION OF THE INVENTION

[0015] Referring to the figures, mining machine 1 consists of the frame 2, cutter head 3, cutter head drives 4 and 5 located within the cutter head boom 6, loading apron 7, crawler tracks 8, and conveyor chains 9. Boom lifting cylinders 15 are located between the forward and return strands of the chains 9. One-sided flights 10 are attached to special links of the chains 9. The chains 9 run around drive sprockets 12 and idler sprockets 11, which are located within the loading apron 7. The drive sprockets 12 are driven by the conveyor chain drives 13. The excavated mineral is deposited by the cutter head 3 onto the loading apron 7. As shown in FIG. 1, the flights 10 follow semicircular paths on the loading apron 7 as they run around the idler sprockets 11 and carry the material between the two chains 9 toward the discharge

well at the rear end 14 of the machine 1. The idler sprockets 11 may be connected with a timing gear in order to align the flights 10 of the two chains 9 to a desired position with respect to one another.

[0016] In an alternate embodiment of the present invention, the conveyor chain drives 13 are located within the loading apron 7 and drive the chain sprockets 11, in which case the sprockets 12 are idler sprockets.

[0017] In yet another embodiment of the present invention, the flights 10 of the two chains 9 are extended so that they overlap and they are not aligned.

[0018] Although the preferred embodiment includes a standard ranging drum cutting head, other cutting arrangements such as universal cutters or auger type cutters, can be employed in combination with the proposed invention. The proposed arrangement and method of gathering and conveying can be used on the machines equipped with tracks, trackless machines or various other configurations of continuous miners. It can be used in combination with load-haul-dump vehicles, continuous haulage or in highwall mining. It can be also used in load-haul-dump conveyances employed in both traditional and highwall mining.

ENGLISH-CLAIMS:
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What is claimed is:

1. A mining machine comprising an excavating means, a propelling means, and a conveying means capable of simultaneous loading.

2. A mining machine according to claim 1, wherein said conveying means comprises two chains with conveying flights located on one side of said chains.

3. A mining machine according to claim 1, wherein said propelling means is external to said mining machine.

4. A mining machine according to claim 2, wherein said chains are synchronized and said flights are aligned in the same positions.

5. A mining machine according to claim 2, wherein said chains are driven from the discharge end of said conveying means.

6. A mining machine according to claim 2, wherein said chains are driven from the feed end of said conveying means.

7. A mining machine according to claim 1, wherein said excavating means is a ranging drum.

8. A mining machine according to claim 1, wherein said excavating means is a universal cutter.

9. A mining machine according to claim 1, wherein said excavating means is at least one auger type cutter.

10. A mining machine according to claim 1, wherein said propelling means is a set of powered tracks.

11. A mining machine according to claim 1, wherein said propelling means is a push beam.

12. A mining machine according to claim 1, wherein said propelling means is an advancer attached to the conveying assembly.

13. A mining machine according to claim 1, wherein said propelling means is an advancer capable of bracing to the roof and floor of the mine opening.

14. A mining machine according to claim 13, wherein said propelling means is an advancer capable of bracing to the sides of the mine opening.

15. A method of combined conveying and loading on a mining machine, comprising: running two conveying chains with conveying flights along a circular path on a loading apron of a mining machine; synchronizing said conveying chains with one another in order to achieve the desired alignment of said conveying flights; scooping the material at the feed end and; discharging the material at the discharge end.

16. A method according to claim 15, wherein said conveying chains are driven from the rear of the mining machine.

17. A method according to claim 15, wherein said conveying chains are driven from the front of the mining machine.

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